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Project for a Europe-Africa permanent link through the Strait of Gibraltar

Note by the Secretary-General

1. The Secretary-General has the honour to transmit to the Economic and Social Council the report prepared in accordance with Council resolution 1999/37 by the executive secretaries of the Economic Commission for Europe and the Economic Commission for Africa on the work that has been done in connection with the project to establish a Europe-Africa permanent link through the Strait of Gibraltar (see annex).

2. The Economic and Social Council has taken an interest in this project since 1982 following a decision by the Governments of Morocco and Spain to carry out joint studies on the feasibility of the project as part of an agreement on bilateral cooperation adopted on 24 October 1980. Since then the Council has regularly requested the two regional commissions to keep track of the progress of studies relating to the project and to inform the Council of any developments.

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Annex

Project for a Europe-Africa permanent link through the Strait of Gibraltar: report on studies and activities carried out during the period 1999-2000

Contents

		Paragraphs	Page
	Introduction	1–6	3
I.	Project studies and activities	7–15	3
	A. Physical environment	7–11	3
	B. Engineering	12	5
	C. Socio-economic aspects	13–15	5
II.	Other project activities	16–17	5
III.	Future work	18–19	5

Introduction

1. In its resolution 1999/37 of 28 July 1999, the Economic and Social Council requested the executive secretaries of the Economic Commission for Africa and the Economic Commission for Europe to take an active part in the follow-up to the project for a Europe-Africa permanent link through the Strait of Gibraltar and to report to the Council at its substantive session of 2001.

2. This report, drawn up jointly by the two regional commissions in response to that request, gives a brief overview of the progress made following studies carried out in 1999-2000. It also takes account of other project-related activities, in particular activities organized further to Council resolution 1999/37 under the joint auspices of the two regional commissions and the International Tunnelling Association (ITA), a non-governmental organization in consultative status with the Council.

3. It should be recalled that studies designed to advance the project have been carried out jointly by the Governments of Morocco and Spain since 24 October 1980, the date on which the two Governments adopted a bilateral agreement on the subject. This agreement, which was later expanded by a supplementary agreement of 27 September 1989, formally establishes both Governments' commitment to make a joint study of the feasibility of the project, and stipulates the creation of a standing intergovernmental Joint Committee, to be responsible for carrying out the agreement, and two State companies, one in Morocco and the other in Spain, to be responsible for conducting the studies. These companies, which have been working alongside the Joint Committee since 1981, are, on the Spanish side, Sociedad de Estudios para la Comunicación Fija a través del Estrecho de Gibraltar (SECEG), which has its head office in Madrid, and, on the Moroccan side, Société Nationale d'Études du Détroit (SNED), whose head office is in Rabat. The studies are carried out on the basis of an equal sharing of the cost, either by the two research companies directly, by scientific institutions in the two countries or by national or international firms of consultants and surveyors with which the companies have concluded agreements or contracts for services.

4. Within the above-mentioned institutional framework, the studies are being carried out in phases and stages of studies. The feasibility studies currently in progress are a follow-up to the pre-feasibility studies which were completed in 1990. The feasibility studies are being conducted in stages, the first of which was completed in 1996. The feasibility studies conducted during the first stage (F1) made it possible to select, for further study, a basic option for implementation of the permanent link project, consisting of a rail tunnel bored beneath the sill of the strait. Nevertheless, reservations were expressed in the 1996 technical and economic formulation of the project concerning the need to learn more about some aspects of the project, and the next stage ("F 2. Feasibility 2") was launched in order to strengthen the earlier formulation.

5. As the previous progress report (E/1999/20) indicated, the deep drilling survey, *Bucentaur 97*, was the most significant activity in stage F2 and represented a turning point in the study process, because it brought to light unexpected geological problems in the deep section of the sill of the strait, which showed that the need for geological investigation by means of offshore drilling would entail far greater technical difficulties, costs and time demands than at first thought. This led to the opening of a new stage, designated "F3. Investigation", based essentially on drilling activities designed to clarify the geological problems raised by *Bucentaur 97*. The most significant activity so far of the current "Investigation" stage has almost certainly been the *Norskald 98/99* survey, which, despite progress in operational terms (resulting in a near doubling of the maximum penetration achieved in the previous survey), has not been able to detect the geological substratum sought in certain critical areas, even though it has provided important confirmation of structural aspects.

6. The following paragraphs, based on the reports submitted by the two research companies to the Joint Committee in 1999 and on information provided directly by the companies, offer a brief description of the project studies and activities during the period 1999-2000.

I. Project studies and activities

A. Physical environment

7. During the period under review, activity was especially significant in the "Physical environment" segment, particularly as far as the following elements are concerned: provisional closure of the geotechnical

exploration structures; exploitation of the *Norskald 98/99* survey, completed in May 1999; preparation for the new deep drilling survey; and, lastly, realization of a comparative study of offshore drilling techniques.

8. The project's geotechnical exploration structures, constructed in 1993-1995 and intensively monitored during their construction and, subsequently, by means of recordings, were closed, in the sense that monitoring and systematic testing were discontinued, since the continuation of observations that were generally constant, or were only occasionally affected by local phenomena of no relevance to the behaviour of the massifs studied, had proved to be of marginal interest. Thus, in late 2000, on the north shore, the exploratory shaft at Bolonia (3.5 m in diameter; 75 m deep) was filled in, while the exploratory gallery at Tarifa (3.8 m in diameter and 600 m long, bored with a tunnel boring machine (TBM)) was reinforced in places and fitted out as a core sample room for the project. On the south shore, repairs were made to the structure at Malabata (one open shaft and one blind shaft 2.5 m in diameter reaching 300 m below sea level, equipped with radial testing galleries totalling approximately 220 m) on account of the natural erosion sustained during the long monitoring period, so as to leave it covered and occasionally accessible in the future for inspection visits or the possible conduct of additional tests in the deep flyschs.

9. The formal exploitation of the *Norskald 98/99* drilling survey concluded in June 2000 with: (a) the realization of the final geological interpretations and the attempt to explain the palaeomorphological characteristics of the study area, with the aid of the usual geological determinations — palaeontology, dating, etc.; and (b) the conduct of geotechnical tests on samples obtained by means of coring undertaken in the survey, which was excellent in terms of both the integrity of the cores and the recovery ratio. Despite the well-known difficulties of inferring the geomechanical behaviour of deep undersea terranes on the basis of laboratory testing of samples that are inevitably very debased by comparison with on-site conditions, it may be indicated that, in principle, the flyschous breccia that constitutes the greater part of the fill material of the palaeochannels studied appears to be of an impermeability similar to that of the flysch formations in place, albeit with a resistance of about 70 per cent. These results, which were discussed at a workshop for experts (cf. paragraph 19), would support the idea of considering the option of negotiating a way through the palaeochannels of the sill by cutting through two short sections of breccia (not more than 2 km in total), rather than insisting on the idea accepted up to now of negotiating a way through by remaining in the flyschs in place, underneath the palaeochannels, at the risk of lowering the route of the structure, perhaps excessively.

10. The results of the *Norskald 98/99* survey having demonstrated the need to conduct surveys involving deeper drilling, the technical difficulties of achieving the desired penetration (about 350 m under a 300 m layer of water) increased considerably, calling for major technical preparation for future surveys. Since one of the most important elements of this problem is clearly the technological approach to the drilling system, the Joint Committee requested from the research companies a complementary report in 1998 on the prospects for alternatives to the approaches that had been followed in previous surveys, namely, utilization of geotechnical drilling vessels with dynamic positioning working during the bimonthly periods ("windows") when currents are moderate. The report on alternative drilling techniques was presented, together with the detailed report on the *Norskald 98/99* survey, at the meeting of the Joint Committee held in Casablanca on 16 September 1999. The former report recommended the "vessel with dynamic positioning" option used thus far, albeit enhanced by certain devices enabling the investigation depth to be increased. In the light of these reports, the Joint Committee took the following decisions: (a) adoption of the "vessel with dynamic positioning" approach for the upcoming surveys; and (b) immediate execution of the next survey in accordance with the aforementioned technological approach. Further to these decisions by the Joint Committee and based on the availability of suitable vessels, the preparation for the survey was moved to the pre-contractual stage, with a view to commencing operations in June-July 2000.

11. In March 2000, following the holding of a workshop in Rabat for experts on the investigation needs of the project and on drilling techniques, some of these experts declared that it would be useful to consider as an alternative approach the use of anchored semi-submersible oil rigs. It was therefore decided to postpone the continuation of the investigations until a comparative study of drilling techniques, to be undertaken by an independent consultant, had

determined the most suitable technique for the upcoming surveys. Pursuant to this decision, the comparative study of the two technological approaches in question was conducted by a maritime classification society under the title "Evaluation of technological approaches to offshore geological coring in the Strait of Gibraltar". This study, completed in February 2001, came out in favour of the "vessel with dynamic positioning" option, concluding that this option would be: (a) the more suitable in terms of the guarantees of technical feasibility; (b) the safer as far as interference with shipping in the Strait is concerned — on the order of 10 times safer, in terms of risk, than the oil rig option; and (c) the more economical — on the order of four times less costly than the oil rig option, always assuming that the reservations regarding the technical feasibility of the latter option were overcome by means of studies and investigations involving anchoring tests. The outcome of the comparative study having thus fully confirmed the directive previously established by the Joint Committee concerning the technological approach to the drilling, the research companies were able to prepare a new work plan for the resumption of the investigations, to be submitted for approval by the Joint Committee at its next meeting.

B. Engineering

12. Studies in the area of engineering were deferred during the period under consideration, pending confirmation of the technical methods to be used in the geological investigations on which they largely depend.

C. Socio-economic aspects

13. Work on this area of the programme focused on the maintenance of the database being used for the gradual recalibration of traffic flow projection models; the next study would have a base year of 2000.

14. In response to the request of the Joint Committee to set up a monitoring system in order to increase knowledge of traffic flows between Europe and Morocco, origin/destination surveys of maritime traffic crossing the strait continued to be conducted in 1999 and 2000, involving about 12,500 enquiries per year and approximately 25,000 users. Those surveys concluded the monitoring period 1997 to 2000 initially programmed for the year 2000 recalibration of the projection models.

15. It should be noted that the planned monitoring of aerial traffic flows between Europe and Morocco using origin/destination surveys in the main Moroccan airports has not yet begun. Although aerial traffic flows are relatively less significant than maritime traffic flows for the recalibration of traffic models, intensive surveys will be carried out in 2001 to compensate for that lack.

II. Other project activities

16. Among the activities carried out under the project, the workshop on the costing of TBM-built tunnels is especially worthy of mention. Organized pursuant to Economic and Social Council resolution 1997/48 under the auspices of the regional commissions concerned and ITA, the workshop was held at Rabat from 22 to 24 April 1999. Thirty-five invited experts and representatives of the research companies discussed 15 communications submitted by 25 authors and co-authors from nine countries. The record of that workshop has been broadly disseminated and is available from ITA.

17. Another noteworthy activity was the above-mentioned technical workshop on deep drilling in the Strait of Gibraltar, held at Rabat from 9 to 10 March 2000. That workshop had brought together 17 experts from seven countries and representatives of the research companies to discuss the project's research needs and a report prepared by those companies on applicable drilling methods.

III. Future work

18. As of the date of this report, the research companies SECEG and SNED had drawn up a new plan of work, which would be submitted to the Joint Committee at its next meeting. The new plan proposes the resumption of the study process for a period of three years with a view to (a) carrying out two major offshore deep drilling surveys, the cost of which would represent about 90 per cent of the programme budget; and (b) producing an updated version of the technical and economic formulation of the project in the light of a reappraisal of the preliminary engineering study and of traffic flow projections.

19. Lastly, the work plan also provides for a number of activities to be carried out under project-related

Council resolutions, namely: (a) the holding of two workshops, under the joint auspices of the regional commissions and ITA, on topics being considered by ITA; and (b) the provision of necessary support to the regional commissions for the preparation of a special follow-up report in 2003 on the conclusion of the "Investigation" stage, similar to the one they had produced in 1993, after 10 years of follow-up.